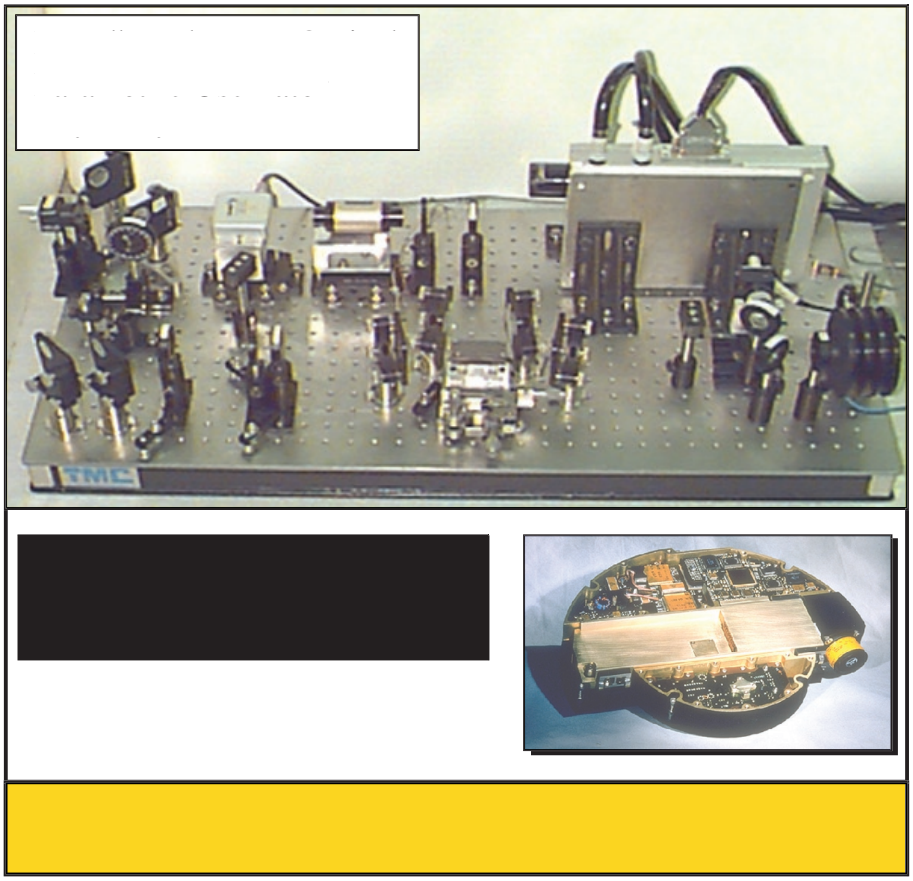
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

MID-IR PERIODICALLY POLED LITHIUM NIOBATE INFRARED COUNTERMEASURES LASER



Sensors Directorate scientists developed periodically poled lithium niobate (PPLN) technology and successfully transferred it to industry for construction of a compact and rugged mid-infrared (IR) brassboard laser. This mid-IR laser source is ready for insertion into fielded infrared countermeasure (IRCM) systems and should provide a major advance in IRCM capabilities.

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Accomplishment

Directorate personnel helped develop and transfer to industry an efficient, compact, low-cost, and broadly tunable technique for generating mid-IR laser radiation. Basic directorate research demonstrated a breadboard laser that generated the power and tunability needed for aircraft protection from infrared missiles.

The approach used PPLN for broadband frequency conversion in the mid-IR spectral region. The directorate then transferred this technology to Northrop Grumman, who assembled a packaged brassboard laser device that successfully performs the countermeasure function.

Background

Compact, tunable, room temperature, solid-state laser sources operating in the mid-IR (1.5-5 μm) spectral region are of interest for a number of applications such as eye-safe laser radar, remote sensing, and IR countermeasures. This spectral region is difficult to generate, particularly by solid-state lasers.

Directorate-led research developed a technique to fabricate PPLN and demonstrated that PPLN could efficiently generate high-power, broadly tunable, mid-IR output in an optical parametric oscillator when pumped by a simple off-the-shelf neodymium pump laser. Breadboard laser systems built in-house and by industry under contract demonstrated multiple watts of tunable mid-IR output.

With directorate help, researchers at Northrop Grumman successfully assembled and demonstrated a brassboard laser system based on the PPLN device. The brassboard device successfully met all requirements, including volume and shape, and is ready for direct substitution into existing Northrop Grumman directed IRCM systems.

Sensors
Technology Transfer

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (02-SN-09)